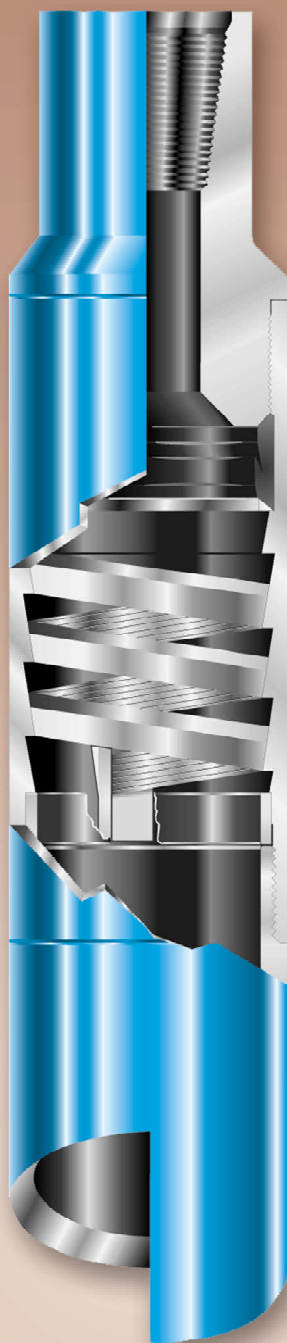


SERIES 150 OVERSHOTS

Instruction Manual 1150



Series 150 Releasing and Circulating Overshots



NATIONAL OILWELL VARCO

One Company Unlimited Solutions

Series 150 Overshots

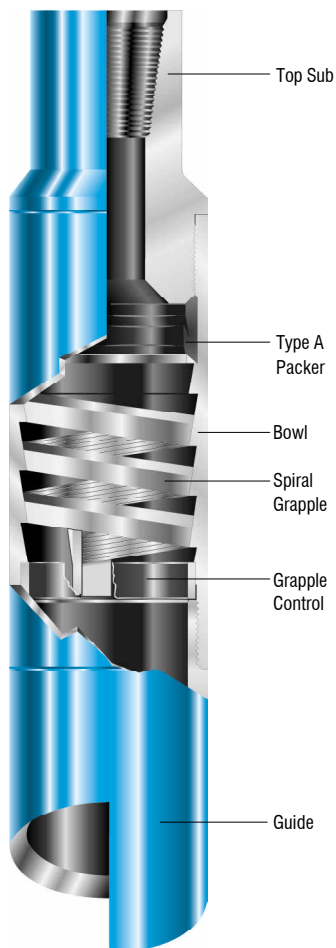
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Series 150 Overshots

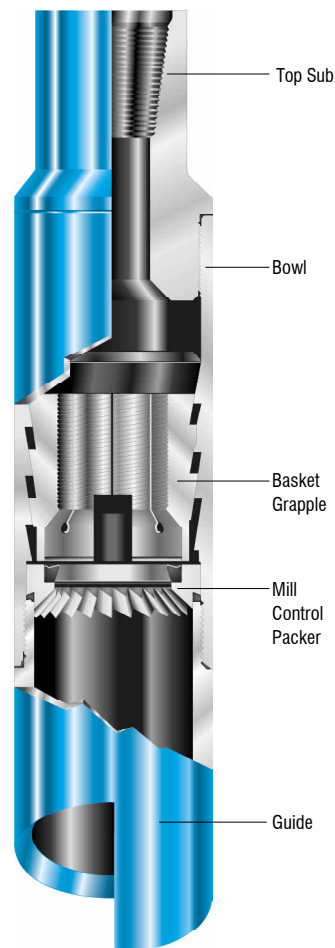
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The designs and specifications for the tools described in this instruction manual were in effect at the time this manual was approved for printing. National Oilwell Varco, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change designs and specifications without notice or without incurring obligation.

Twenty-ninth Printing, September 2005



Series 150 Releasing and Circulating Overshot
Dressed with Spiral Grapple and Parts



Series 150 Releasing and Circulating Overshot
Dressed with Basket Grapple and Parts



General Description

The **Bowen Series 150 Releasing and Circulating Overshot** provides the strongest tool available to externally engage, pack-off, and pull a fish. The basic simplicity and rugged construction with which it is designed have made it the standard of all external catch fishing tools.

The **Bowen Series 150 Releasing and Circulating Overshot** has gained world-wide acceptance for fishing by means of external engagement of a fish. Each Overshot is a carefully engineered unit. In service, it takes a positive grip over a large area of fish and is therefore capable of withstanding extremely heavy pulling, torsional and jarring strains without damage or distortion to either the tool or the fish.

Bowen Overshots are continually developed to new standards of strength and efficiency and are expertly constructed of the highest quality material.

Each Bowen Series 150 Releasing and Circulating Overshot is a compact unit designed to engage, pack off and pull a specific size of tubing, pipe, coupling, tool joint, drill collar or smooth O.D. tool. Through the installation of proper under-size parts, they may be adapted to engage and pack off any smaller size.

Bowen course thread Overshots are designed for easier assembly and maintenance. The Bowen "CT" Overshot has a course ACME thread on the upper end of the Bowl where the Top Sub is attached and at lower end where the Guide is attached. See Supplemental Instruction Manual 1150A for list.

The course thread allows much easier field assembly and will stand more abuse than the fine series currently offered. The internal parts are completely interchangeable with existing Bowen Overshots.

Cross over bushings can be provided from fine thread series to course thread series, allowing full use of Bowls, Top Subs, and Guides currently in stock.

All sizes of Bowen Series 150 Releasing and Circulating Overshot are available in Full Strength or Slim Hole Types. Despite the extremely small outside diameters of Full Strength Type Overshots, they are engineered to withstand the pulling, torsional and jarring strains, which must be exerted by modern machinery, to release and retrieve a lost fish.

The Slim Hole Type Overshots have reduced outside diameters, as compared to the Full Strength. They are used to perform pulling jobs in tight holes where no other outside catch, releasing fishing tool can be run.

Use

A Bowen Series 150 Releasing and Circulating Overshot is used to engage, pack off and retrieve twisted-off or lost tubing, drill pipe, coupling, tool joint, casing or other similar fish.

Construction

The Bowen Series 150 Releasing and Circulating Overshot is composed of three outside parts: the Top Sub, Bowl, and Guide. The Basic Overshot may be dressed with either of two sets of internal parts, depending on whether the fish to be caught is near maximum catch size for the particular overshot.

If the fish diameter is near the maximum catch of the Overshot, a Spiral Grapple, Spiral Grapple Control and Type "A" Packer are used. If the fish is a tubing collar, a Type "D" Collar Packoff Assembly will replace the Type "A" Packer.

If the fish diameter is considerably below maximum catch size (usually $1\frac{1}{2}$ "), a Basket Grapple and a Mill Control Packer is used.

Gripping and Releasing Mechanism

The Bowl of the Overshot is designed with helically tapered spiral section in its inside diameter. The gripping member (Spiral Grapple or Basket Grapple), is fitted into this section. When an upward pull is exerted against a fish, an expansion strain is spread evenly over a long section of the fish. No damage or distortion results to either the fish or the Overshot. This design permits a far stronger tool with a smaller outside diameter than is possible with an overshot that employs a single tapered section which supports slips.

A Spiral Grapple is formed as a left-hand helix with a tapered exterior to conform with the helically tapered section in the Bowl. Its interior is wickered for engagement with the fish.

A Basket Grapple is an expansible cylinder with a tapered exterior to conform to the helically tapered section in the Bowl. Its interior is wickered for engagement with the fish.

Three types of Basket Grapples are available to meet the need for catching various types of fish:

The Plain Basket Grapple is standard, and will always be furnished unless another type is specified. It is wickered for its entire interior length. It is used to catch any plain single diameter fish.

The Basket Grapple with Long Catch Stop has an internal shoulder located at the upper end, to stop the fish in best catch position. It is designed to stop and catch an upset, or box section of a tool joint, with sufficient length left below the Grapple to allow the joint or upset to be packed off with a Basket Mill Control Packer.

The Basket Grapple with Short Catch Stop has a double set of wickers, of two different internal diameters. It is used to stop and catch a coupling with a ruptured piece of pipe engaged in its upper end. The upper set of wickers will catch the ruptured pipe, and act as a stop against the coupling, while the lower set of wickers will catch the coupling. The coupling will be stopped in best position to be packed off by the Mill Control Packer.

Grapple Controls are of two types: Spiral Grapple Controls are used with Spiral Grapples; Mill Control Packers are used with Basket Grapples.

Grapple Controls are used as a special key, to allow the Grapple to move up and down during operation while simultaneously transmitting full torque from the Grapple to the Bowl.

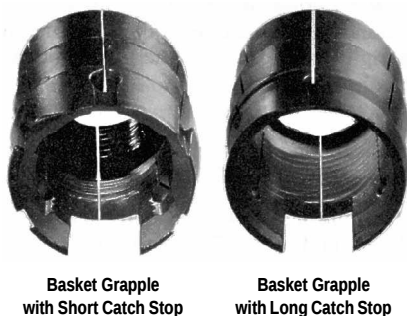
Spiral Grapple Controls and Basket Grapple Controls are plain. Mill Control Packers include a packoff. See Pack-off Mechanism for a complete explanation.

In operation, the Overshot functions in the same manner, whether dressed with Spiral Grapple parts or Basket Grapple parts

During the engaging operation, as the Overshot is rotated to the right and lowered, the Grapple will expand when the fish is engaged, allowing the fish to enter the Grapple. Thereafter with rotation ceased and upward pull exerted, the Grapple is contracted by the tapers in the Bowl and its deep wickers grip the fish firmly.

During the releasing operation, a sharp downward bump places the larger portion of the Bowl tapers opposite the Grapple smaller tapered portion, breaking the hold. Thereafter, when the Overshot is rotated to the right, and slowly elevated, the wickers will screw the Grapple off the fish, effecting release.

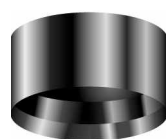
The fact that Bowen Releasing and Circulating Overshots require right hand rotation only, both during engaging and releasing operation, is extremely important. This feature eliminates the dangers that are present when it is necessary to rotate the string to the left.



Pack-off Mechanism

The type of Pack-off used depends on how the Overshot is dressed, and the operator's choice.

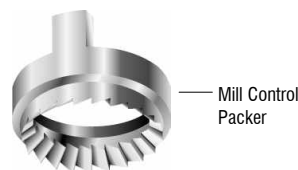
When the Overshot is dressed with a Spiral Grapple, a Type "A" Packer is used. The Type "A" Packer is a sleeve type. It seats at its O.D. against the inside of the Bowl. It has an internal lip which seals around the fish. Each type "A" Packer is designed to pack off a specific size. A



Type A Packer



Inner Seal



Mill Control Packer



Outer Seal

Type R Mill Control Packer

Type "A" Packer should be ordered for each catch size Spiral Grapple.

A Mill Control Packer is used when the Overshot is dressed with a Basket Grapple. The Type "R" Mill Control Packer is used when a packoff is required. The unique double lip seal of the Mill Control Packer provides a positive seal of the fish. The Packer is self energized and is retained within the Mill Control by a lower second sealing lip and requires no adhesive for retaining the Packer. The Type "R" is most commonly used. It has a replaceable inner seal and a replaceable outer seal. The inner seal and the outer seal may both be replaced in the field when required. The Type "R" Mill Control (with mill teeth) is available. Mill Control Packers are designed to remove small burrs and rough breaks only. Replacement inner and outer seals are listed on page 20. Also see the special High Pressure Pack-off accessories on page 19.

All Mill Control Packers are manufactured to pack off a specific size. One should

be ordered to match each size Basket Grapple. Mill Control Packers when used, replace a Plain Basket Control. The Plain Basket Control is used with a Basket Grapple when no pack-off of the fish is required.

Type "D" Packer assemblies are available to pack off tubing collars in tubing size Series 150 Overshots. The Type "D" Packer assembly consists of a Packer, a Spring and an O-Ring. It is assembled in the Bowl above the Grapple. Its upper end is sealed in a counter-bore in the Top Sub, by the O-Ring. In operation, its lower end stops the collar in proper catch position, while the integral molded seal enters and packs off the collar threads at the top of the collar. These Packers are listed on page 16.

The Type "D" Collar Packer is designed to be used with a Spiral Grapple, in place of a Type "A" Packer, where the collar being fished is too short to allow effective catch and pack off length.



Series 150 Overshot with Type D Packer in Packed Off Position



Type D Packer Assembly

Operation

First determine that the Overshot is properly assembled, is dressed with the proper size Grapple and that all its parts are in good working condition. Refer to Specifications beginning on page 11.

Obviously, if the fish is smaller than the maximum outside diameter that the Overshot was designed to engage, install undersize parts.

If the hole size is so much greater than the fish size that it is possible for the Overshot to pass alongside the fish, install either a Wallhook Guide or an Oversize Guide in place of the Standard Guide. (see page 18)

If the top of the fish is a heavily burred tool joint, replace the Standard Guide with the proper Milling Guide, Type A or C. (see page 19)

If the fish has an unengageable upper end, install an Extension between the Top Sub and the Bowl (see illustration on page 7).

Using the Top Sub, connect the Overshot to the fishing string and run it in the hole.

To Engage and Pull the Fish

As the top of the fish is reached, slowly rotate the fishing string to the right and gradually lower the Overshot over the fish; combined rotating and lowering is important.

Allow the right-hand twist to slack out of the fishing string and then pull on the fish by elevating the fishing string.

If the fish does not come, turn on the circulating pumps and maintain an upward strain while circulation is forced through the fish.

To Release from the Fish

Bump down; then simultaneously rotate to the right and slowly elevate the fishing string until the Overshot is clear of the fish; combined rotating and elevating is important.

To release from a recovered fish, follow the same procedure while holding the fish below the Overshot.

Precautions

Unless an upward strain is maintained, never rotate the fishing string to the left while the Overshot is engaged with the fish.

Always bump the full weight of the fishing string before starting releasing operations.

Always shut off the circulating pumps before lowering the Overshot over the fish.

Function of the Overshot in Engaging the Fish

After the Overshot has reached the top of the fish, combined rotation and lowering results in the following:

1. The guide will direct the fish into the Overshot.
2. The Grapple will expand and the fish will pass through it.
3. The fish will pass through the Pack-off Rubber and will be halted when it contacts the pin end of the Top Sub. In the case where an external upset section is being engaged by a Basket Grapple, the fish will be halted by the solid steel stop in the upper end of the Basket Grapple.
4. The fish is now properly located in the Overshot and thereafter when upward pull is exerted, the Grapple is contracted by the tapers in the Bowl and the hold will be secure.

5. Likewise, once the fish is in this position, the circulation will seal the Packoff Rubber around the fish and prevent fluid passage down the outside. Thus, by building up pressure with the pumps, the fluid can be forced down through the fish.

Function of the Overshot when Releasing

The sharp downward bump places the largest portion of the Bowl tapers opposite the Grapple and breaks the hold. Right-hand rotation expands the Grapple and by maintaining right-hand rotation, the Overshot may be withdrawn from the fish.

Function of the Grapple

The mechanical conditions which caused the Grapple to expand and contract are:

1. The Grapple is a left-hand helix.
2. The lower end of the Grapple is anchored in the Overshot Bowl.
3. The inside diameter of the Grapple is smaller than the outside diameter of the fish.

As the Overshot is rotated to the right and lowered over the fish, the drag of the fish against the grapple causes the Grapple to unwind and expand sufficiently to allow the fish to enter.

As the Overshot is rotated to the right and withdrawn from the fish, the drag of the fish against the Grapple causes the Grapple to unwind and expand sufficiently to allow the Overshot to be withdrawn.

Undersize Parts

Undersize parts are used when the fish to be caught is smaller than the maximum catch size of the Overshot.

Spiral Parts

Undersize Spiral parts: Spiral Grapple and Type "A" Packer are used to catch sizes from "Maximum Catch Spiral Grapple", down to "Maximum Catch-Basket Grapple," as specified in the specifications tables on pages 11 thru 15 inclusive.

These Spiral Grapples and Type "A" Packer should be changed for each different size fish. They will effectively catch and pack off worn fish as much as $3\frac{1}{32}$ " maximum undersize. The over-range of each grapple is approximately $1\frac{1}{32}$ ".

There are exceptions, particularly in the Slim Hole type Overshots. Some of these will effectively catch undersize or oversize fish by no more than $1\frac{1}{16}$ " maximum.

Basket Parts

Undersize Basket parts are used to catch sizes from "Maximum Catch-Basket Grapple" as specified in the specification tables of pages 11 thru 15 inclusive, down to any smaller size.

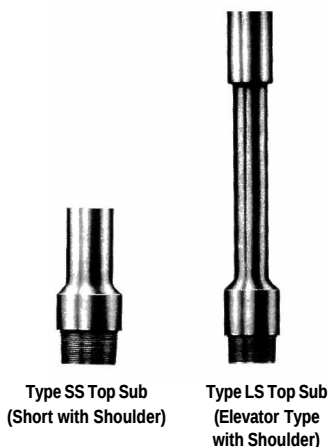
Basket Grapples should be changed for each size fish to be caught.

Mill Control Packers should be changed for each size fish.

Where a Plain Basket Control is used in place of a Mill Control Packer, it need not be changed for use with undersize Basket Grapples.

Basket Grapples will effectively catch fish worn as much as $3\frac{1}{32}$ " maximum undersize. The over range of each grapple is approximately $1\frac{1}{32}$ ".

There are exceptions, particularly in the Slim Hole type Overshots. Some of these will effectively catch undersize fish by more than $1\frac{1}{32}$ " maximum.



Overshot Accessories Top Subs

Top Subs are available for Bowen Overshots in two types: SS, Short Sub with shoulder; and LS, Elevator Sub with shoulder. Type SS Top Subs are furnished as part of the assembly, unless otherwise specified.

Lock Rings

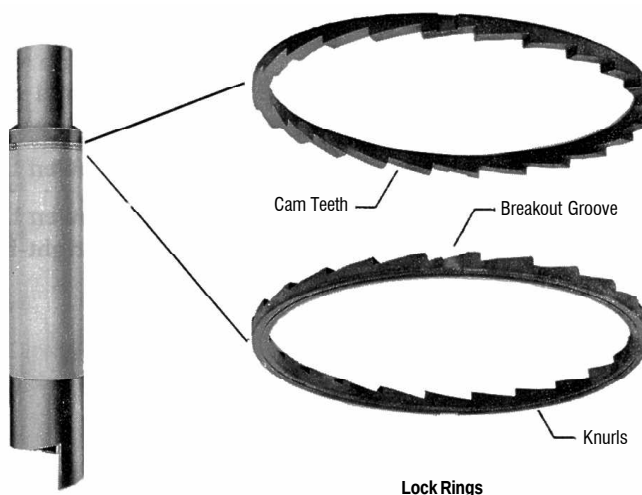
Bowen Lock Rings are available as optional equipment to prevent the Top Sub and Bowl of Bowen Series 150 Releasing and Circulating Overshots from unthreading during backing-off operations. Use of Bowen Lock Rings eliminates the weakening practice of drilling and tapping the Bowl to install a set screw for securing the Bowl to the

Top Sub. The Rings also eliminate the weakening and hazardous practice of welding a steel strap across the Bowl and Sub joint to hold them in place. Using excessive torque when making-up these joints is also no longer necessary if the rings are used.

Bowen Lock Rings provide a positive and releasable means for locking straight-threaded shouldered joints so they will not back off.

Extension Subs

If a twist-off has left a fish whose upper end is unengageable, an Extension Sub should be installed between the Top Sub and the Bowl of the Overshot. This will permit lowering of the Overshot over the fish far enough to insure engagement and a perfect pack off in the fishing operation. Extension Subs are listed on page 21.



Construction

Bowen Lock Rings are used in pairs consisting of two identical rings. The rings have cam-teeth on one face, knurls on the other, and two breakout grooves on the edges. They are precision made from alloy steel, stress relieved, and heat treated.

Assembly

One Lock Ring is inverted and placed on the other so the cam-teeth intermesh and the breakout grooves are aligned, and then they are placed on the Top Sub. The Bowl is threaded on, and as the joint is made-up, the knurled faces opposite to the cam-teeth dig in and grip the shoulders. The pitch on the cam-teeth is greater than the thread pitch, so if reverse rotation is applied, the cam-teeth begin to ride up on each other. This produces a wedging action which effectively locks the Top Sub to the Bowl.

The joints are properly made up when reverse torque has been applied and a slight separation in the cam-teeth shoulders is observed. Heavy make-up torque is not required.

When the Overshot is dressed with a spiral grapple and type "A" Packer, a Spacer is required between the Packer and Top Sub. Please refer to Lock Ring Table on page 21. The purpose of the Spacer is to fill the space produced by the extra standoff of the Top Sub when used with the Lock Rings. No Spacer is required when "A" Packer is not used.

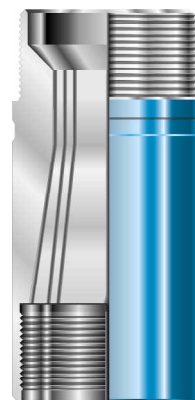
Disassembly

When unthreading is desired, a special Bowen Lock Ring Breakout Clamp is required. Slight right-hand torque may have to be applied for lining-up the Ring breakout grooves to receive the Clamp.

The Breakout Clamp consists of two keys that fit into the Lock Ring grooves, a lower key seat, and an extended pin flat link chain attached at one end to a bracket which has a guide for another (movable) key seat attached to a screw handle.

To position the Breakout Clamp, the screw handle is backed-up as far as it will to, the other end of the chain is put through a hole in the lower key seat, and the keys are placed in the ring grooves opposite each other. The chain is then pulled around the rings so that all slack is removed and the nearest pin is slipped into the pin slot on the bracket. The

screw handle is then tightened which forces the slightly tapered keys into the Lock ring breakout grooves, holds the cam-teeth together, and permits the shoulders to back away from the knurled faces when the joint is broken. Lock Rings are listed on page 21.

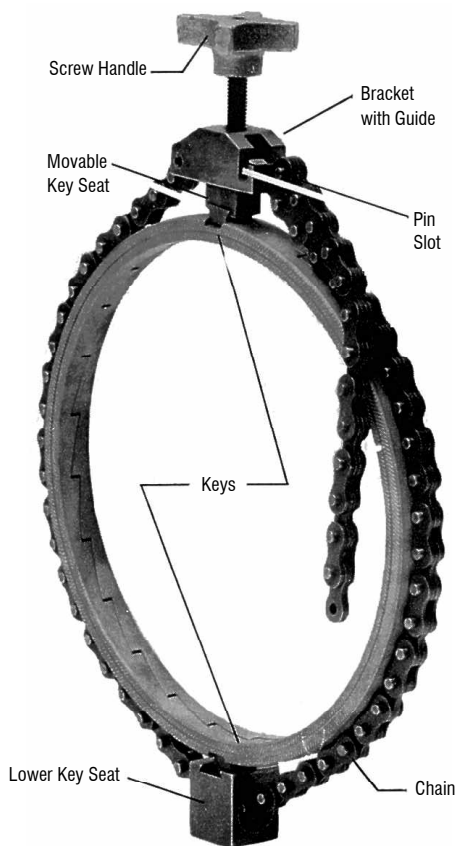


Itcoloy Mill Extension

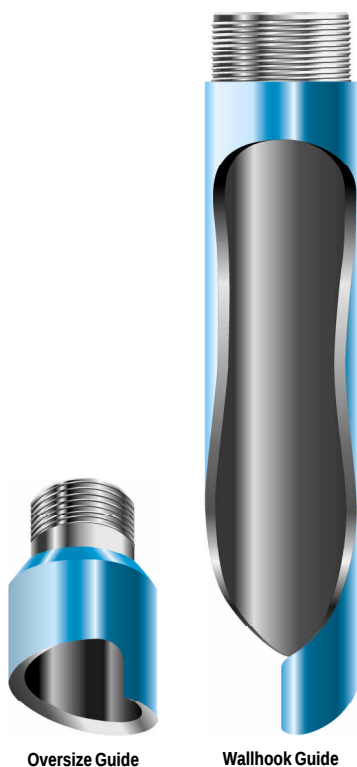
Itcoloy Mill Extension

Itcoloy Mill Extensions are used to mill away flared or jagged metal from the top of the fish so that the fish will pass easily into the Overshot Bowl. For ordinary work, they are installed between the Bowl and the standard, oversize or wall hook guides.

The Itcoloy Mill Extension is also used in the Bowen Subsea Sheared Pipe Retrieval Method (see page 9). In this case it is installed between the Overshot Bowl and the special guides. They may be ordered by giving the Overshot number and specifying "Itcoloy Mill Extension Type" and fish size. Prices available on request.



Lock Rings with Breakout Clamp Installed
Psrt No. 65912



Oversize Guide

Wallhook Guide

Guides

If the hole size is so much greater than the fish size that it is possible for the Overshot to pass alongside the fish, an **Oversize Guide** or a **Wallhook Guide** must be installed in place of the Standard Guide to insure alignment of the fish with the Overshot. These are listed on page 18.

Twist-offs in tool joints are not always immediately revealed at the surface and as a result drilling is not halted at once. In such cases the top of the fish is usually a badly burred tool joint, or drill pipe, and a Type A Mill Guide must be installed on the Overshot to trim the burr off the fish so that it can enter the Overshot. Itcoloy Mill Guides perform the same service on undersize tool joints and are also used when the top of the fish is an unusually jagged section of pipe. More information on these is shown on page 19.

Itcoloy Mill Guide

Itcoloy Mill Guides are used to mill away jagged metal from the top of the fish so that the fish will pass easily into the Overshot Bowl.

They may be ordered, using the standard Guide number, and specifying, "Itcoloy Mill Guide Type C" and fish size.

Subsea Sheared Pipe Retrieval

During operations from a floating rig, there is often many hundred feet of drilling string extending from the rig to the sea floor, through the wellhead blowout preventer (BOP) stack, and down into the well. If occurrences like a blowout, a loss of anchor and the rig drifts, a dangerous storm is approaching, etc., it is sometimes necessary for the rig to hurriedly move from the well-site. This is done by temporarily severing the drill string inside the BOP and only tripping-out the upper end.



Type A Mill Guide

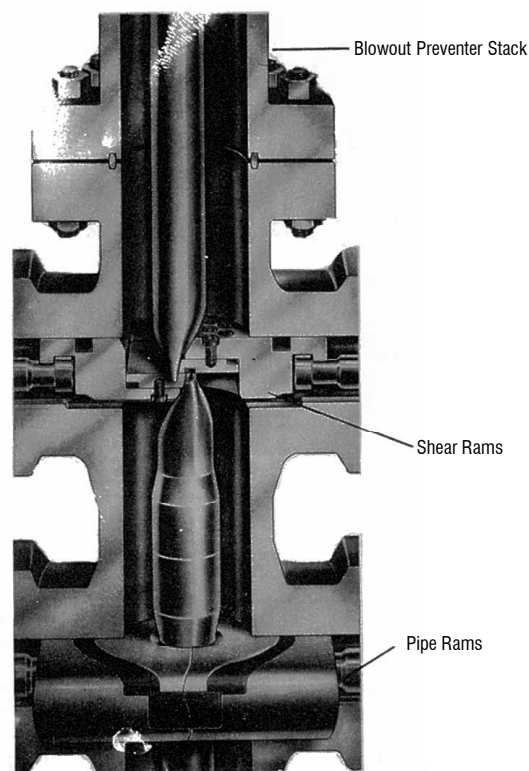


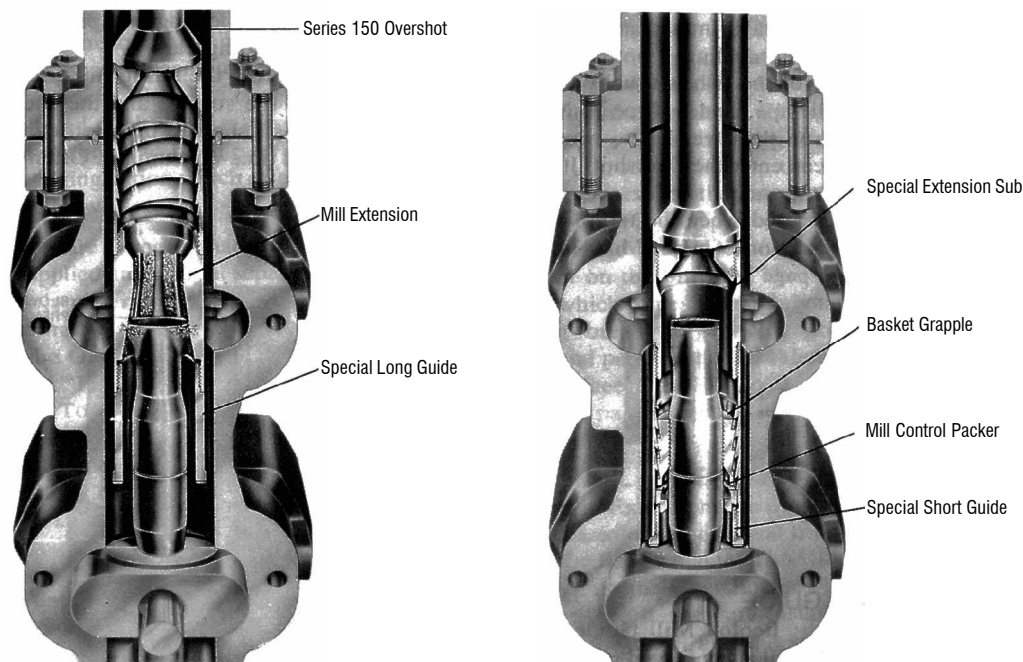
Itcoloy Mill Guide

The BOP being used must have at least two sets of rams: lower pipe rams and shear rams above them. Before shearing, it is necessary to land the nearest tool joint on the pipe rams and close them to suspend and pack off the string. The shearing then produces flattened flare-ends with protruding ears.

When the rig returns, the string must be retrieved, the end brought to the surface and the sheared piece removed. In the past, sheared pipe retrieval has been difficult, costly and time-consuming. Often large parts of the BOP stack must be brought to the surface to effect retrieval.

The Bowen method of sheared pipe retrieval can be achieved in a simple, time-saving and economical manner. It requires only two easy steps using the Series 150 Circulating and Releasing Overshot equipped with a few special accessories





Step 1: Flare Mill-Down

The standard guide, grapple and packer have been removed from a Bowen Overshot and it is then dressed with a Mill Extension and special flat-bottom Long Guide, and installed on the drill string. The Mill Extension has tapered milling ribs of Bowen Itcoloy (sintered tungsten carbide) facing on its I.D. The Overshot is lowered into the BOP and over the end of the drill pipe, and then rotation takes place to mill down the flared ears of the sheared pipe. The end of the Long Guide is faced with soft metal so that if inadvertently it contacts the BOP pipe rams, it does not damage them. The Guide is also of a length which prevents the Mill Extension from contacting and damaging the tool joint in the BOP. This is important because this joint O.D. is where engagement of the string will take place.

Step 2: Engage and Pull

After the milling step is completed, the Bowen Overshot is brought back to the surface, dressed with a special flat-bottom Short Guide, Extension Sub and a Basket Grapple and Mill Control Packer sized to engage the joint. (The Short Guide also has a soft metal end to prevent ram damage.) The Overshot is lowered again and as it enters the BOP, the milled-down flare-end passes through the Grapple and Mill Control Packer, and is housed in the Extension Sub while the Grapple engages and packs off the tool joint. A pull is exerted on the Overshot to make certain of engagement and then the BOP pipe rams are retracted, and the string is raised to the rig floor where the severed joint is removed and replaced, allowing normal operations to resume.

Bowen sheared Pipe Retrieval Overshot assemblies are available for all sizes of drill pipe and BOPs. Prices will be quoted on request.

How to Order

Specify:

- (1) Make and working bore size of BOP
- (2) The distance between the counter lines of the BOP pipe rams and shear rams
- (3) Drill pipe body O.D. and tool joint O.D. and length

Assembly Lists

The lists of assemblies and accessories in this Instruction manual have been reduced to the most popular Overshots and parts worldwide. This has been done to make it easier for the customer to quickly find the information they require and also for the ease of transmitting the electronic version of the file.

The Bowen Series 150 Overshot product line consists of many different sizes and types of assemblies and items. A list of over 225 of these is in Supplemental Instruction Manual 1150A. If a locally popular assembly is not listed in Manual 1150 it will most probably be listed in Manual 1150A. However, this is still not a complete list. There are additional assemblies not listed.

The standard Series 150 Overshot is a right-hand operation tool with right-hand threads. But there are many specials offered. Some of the other tools made are right-hand tools with left-hand threads, left-hand tools with left-hand threads, left-hand tools with right-hand threads, tools for H₂S service, tools for CO₂ service, tools for H₂S and CO₂ service, very high strength tools, very thin wall tools, and with sizes ranging from 2⁵/₁₆" OD to above 32" OD.

Even with all the possible combinations, National Oilwell continues to design new assemblies to add to a product line that was started almost 60 years ago!

Specifications

Maximum Catch Size (Spiral)		2	2-1/8	2-3/8	2-1/2	2-1/2	2-7/8	3-1/16	3-1/16	3-1/8
Maximum Catch Size (Basket)		1-13/16*	1-3/4	2	2	2	2-19/32	2-11/16	2-19/32	2-5/8
Overshot O.D.		2-5/16	2-21/32	3-1/8	3/3/8	3-5/8	3-5/8	3-3/4	3-15/16	3-7/8
Standard Box Connection		Per Customer Order								
Type		SH	SH	XSH	SH	FS	XSH	SH	SH	SH
Complete Assembly	Part No.	B-8919	C-10199	9305	C-4623	C-5080	9270	37585	C-5101	C-1835
(Dressed with Spiral Parts)	Weight	13	28	42	46	55	51	50	60	56

Replacement Parts

Top Sub	Part No.	A-8920	A-10200	9311	A-5083	A-5081	9276	37586	A-5102	A-1842
	Weight	7	13	20	22	25	26	25	30	28
Bowl	Part No.	B-8921	B-10201	9306	B-5088	B-5082	9271	37587	B-5103	B-1836
	Weight	2-1/2	6	9	10	13	11	11	14	16
Packer	Part No.	9407	B-10202	9309	B-5089	B-3395	8550	37588	B-3594	B-1839
	Weight	1/8	1/8	1/8	1/8	1/8	1/4	3/8	3/8	3/8
Packer Seat Ring	Part No.	A-8922	A-10203	9310	A-5090	A-5084	9274	37589	A-3595	A-1840
	Weight	1/32	1/16	1/8	1/8	1/8	1/8	1/8	1/8	1/8
Spiral Grapple	Part No.	9403	B-10204	9307	B-5091	B-5085	9272	37590	B-3596	B-1837
	Weight	5/8	3/4	3/4	3/4	3/4	1-1/8	1-1/4	1-1/2	1-1/2
Spiral Grapple Control	Part No.	9405	A-10205	9308	A-5092	A-5086	9273	37591	B-3597	A-1838
	Weight	1/8	1/2	3/4	3/4	3/4	3/4	3/4	7/8	1
Standard Guide	Part No.	9404	A-10206	9312	A-5093	A-5087	9275	37592	A-3598	A-1841
	Weight	1-1/2	7	11	12	15	11	11	13	16

Basket Parts

Basket Grapple	Part No.	9403	B-10204	9307	B-5091	B-5085	9272	37590	B-3596	B-1837
	Weight	3	3-1/2	3-3/4	3-3/4	3-3/4	5-5/8	6	7-1/2	7-1/2
Basket Grapple Control	Part No.	9405	10205	9308	A-5092	A-5086	9273	37591	B-3597	A-1838
	Weight	1-1/2	2	2-1/4	2-1/4	2-1/4	2-1/4	2-1/2	2-5/8	3
Mill Control Packer	Part No.	9407-R	10202-R	9309-R	B-5089-R	B-3395-R	8550-R	37588-R	B-3594-R	B-1839-R
	Weight	2	2-1/2	3	3	3	3	3-1/4	3-1/2	4

* Spiral and Basket size

How to Order

Specify:

- (1) Name and number of assembly or part
- (2) Size and type of fish to be caught
- (3) Top connection
- (4) O.D., if other than standard

SPECIAL NOTES:

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RECOMMENDED SPARE PARTS:

Spiral:

- (1) 3 Packers
- (2) 2 Grapples for each size
- (3) 1 Control

Basket:

- (1) 2 Grapples
- (2) Mill Control Packers for each size

Mill Control Packer:

- (1) 3 Inner and 3 Outer Seals

Specifications

Maximum Catch Size (Spiral)		3-1/8	3-3/8	3-1/2	3-21/32	3-21/32	3-3/4	3-3/4	4	4-1/4	4-5/8	4-5/8
Maximum Catch Size (Basket)		2-5/8	2-7/8	2-7/8	3-1/8	3.220	3-7/32	3-1/4	3-1/2	3-11/16	4-1/8	4-1/8
Overshot O.D.		4-1/8	3-7/8	4-3/8	4-9/16	4-11/16	4-5/8	4-11/16	4-7/8	5-9/16	5-1/2	5-5/8
Standard Box Connection		Per Customer Order										
Type		FS	XSH	SH	SH	FS	SH	SFS	SH	FS	SH	FS
Complete Assembly (Dressed with Spiral Parts)	Part No.	9105	21300	C-4619	C-5151	9109	C-5129	9120	C-5154	5896	C-4969	5698
	Weight	70	70	72	77	83	82	83	95	130	120	130

Replacement Parts

Top Sub	Part No.	9106	21301	A-4620	A-5152	9110	A-5130	9110	A-5155	5897	A-4970	5699
	Weight	33	33	36	38	40	42	40	48	61	60	65
Bowl	Part No.	9107	21302	B-4621	B-5153	9111	B-5131	9121	B-5156	5898	B-4971	5700
	Weight	18	18	18	19	21	20	21	24	34	30	33
Packer	Part No.	809	21303	6515	L-6665	6665	B-5538	9122	B-5157	169	L-1140	1140
	Weight	3/8	3/8	3/8	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8
Packer Seat Ring	Part No.	1748	21304	A-3358	A-4338	43496	A-5132	6666	A-5158	172	L-1136	1136
	Weight	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
Spiral Grapple	Part No.	1741	21305	B-3607	B-4339	6662	B-5133	9123	B-5159	165	M-1135	1135
	Weight	1-1/2	1-1/2	1-1/2	1-3/4	1-3/4	1-3/4	2	2	2-1/2	2-1/4	2-1/4
Spiral Grapple Control	Part No.	1747	21306	B-3608	B-4340	6674	A-5134	9124	B-5160	186	M-1137	1137
	Weight	1	1	1-1/8	1-1/4	1-1/4	1-1/4	1-1/2	1-1/2	2	1-1/2	1-1/2
Standard Guide	Part No.	1746	21307	A-4622	A-4341	6667	A-5135	9125	A-5161	187	M-1138	1143
	Weight	17	17	15	16	18	16	18	19	30	25	27

Basket Parts

Basket Grapple	Part No.	1741	21305	B-3607	B-4339	6662	B-5133	9123	B-5159	165	M-1135	1135
	Weight	7-1/2	7-1/2	7-1/2	8-3/4	8-3/4	8-3/4	8-3/4	10	12-1/2	11-1/4	11-1/4
Basket Grapple Control	Part No.	1747	21306	B-3608	B-4340	6674	A-5134	9124	B-5160	186	M-1137	1137
	Weight	3	3	3-3/8	3-3/4	3-3/4	3-3/4	3-3/4	4-1/2	6	4-1/2	4-1/2
Mill Control Packer	Part No.	809-R	21303-R	L-7065-R	L-6665-R	6665-R	B-5538-R	9122-R	B-5157-R	169-R	L-1140-R	1140-R
	Weight	4	4	4-1/2	5	5	5	5	6	8	6	6

How to Order

Specify:

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SPECIAL NOTES:

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RECOMMENDED SPARE PARTS:

Spiral:

- (1) 3 Packers
- (2) 2 Grapples for each size
- (3) 1 Control

Basket:

- (1) 2 Grapples
- (2) Mill Control Packers for each size

Mill Control Packer:

- (1) 3 Inner and 3 Outer Seals

Specifications

Maximum Catch Size (Spiral)	4-3/4	4-3/4	5	5	5-1/8	5-1/4	5-3/8	5-1/2	6-1/4	6-1/4	6-1/4
Maximum Catch Size (Basket)	4-1/4	4-1/4	4-1/2	4-3/8	4-5/8	4-5/8	4-3/4	4-7/8	5-5/8	5-9/16	5-1/2
Overshot O.D.	5-5/8	5-3/4	5-29/32	6-1/8	5-3/4	6-3/8	6-1/2	6-5/8	7-3/8	7-5/8	7-7/8
Standard Box Connection	Per Customer Order										
Type	SH	FS	SH	SFS	SH	SH	SH	SH	SH	SFS	FS
Complete Assembly Part No.	C-5168	8975	C-5171	7787	C-11823	6655	4773	8625	9692	8741	C-2108
(Dressed with Spiral Parts) Weight	133	138	140	157	160	176	182	185	216	241	261

Replacement Parts

Top Sub	Part No.	A-5169	8976	A-5172	7789	A-11824	6656	4774	8626	9693	8742	B-2106
	Weight	62	64	65	69	69	78	79	78	87	99	105
Bowl	Part No.	B-5170	8977	B-5173	7788	B-11825	4503	9205	8617	9694	1641	B-2109
	Weight	32	33	34	40	33	52	53	54	62	69	76
Packer	Part No.	B-2199	6114	L-5950	5950	B-11826	94505	9209	8618	9689	1642	L-1680
	Weight	3/4	3/4	3/4	3/4	3/4	33/4	7/8	3/4	1-1/8	1-1/8	1-1/8
Packer Seat Ring	Part No.	A-2200	6120	A-4368	5945	LA-11827	4510	9210	8622	9690	1643	A-2072
	Weight	1/8	1/8	1/8	1/4	1/8	3/8	3/8	3/8	1/4	3/8	3/8
Spiral Grapple	Part No.	B-2021	6112	B-4369	5942	B-11828	4498	9207	8619	9687	1644	B-2073
	Weight	2-1/2	2-3/4	2-1/2	2-1/2	2-1/2	33	3	4	5	5-1/4	5-3/4
Spiral Grapple Control	Part No.	B-2202	6113	B-4370	5944	A-11829	4499	9208	8620	9688	1645	A-2074
	Weight	2	2-1/4	2	2-1/4	2	2-1/2	2-1/2	2-1/2	3	3-1/4	3-1/2
Standard Guide	Part No.	B-2203	6121	B-4371	5946	A-11830	4504	4775	8621	9691	5525	A-2075
	Weight	33	34	34	42	33	39	43	45	58	63	69

Basket Parts

Basket Grapple	Part No.	B-2201	6112	B-4369	5942	B-11828	4498	9207	8619	9687	1644	B-2073
	Weight	12-1/2	13-1/2	12-1/2	14	12-1/2	15	16	20	25	27	28-3/4
Basket Grapple Control	Part No.	B-2202	6113	B-4370	5944	A-11829	4499	9208	8620	9688	1645	A-2074
	Weight	6	6-1/2	6	7	6	7-1/2	8	7-1/2	9	10	10-1/2
Mill Control Packer	Part No.	B-2199-R	6114-R	L-5950-R	5950-R	11826-R	4505-R	L9209-R	L-8618-R	9689-R	1642-R	L-1680-R
	Weight	8	8	8	9	18	10	10	10	12	13	14

How to Order

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SPECIAL NOTES:

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RECOMMENDED SPARE PARTS:

Spiral:

- (1) 3 Packers
- (2) 2 Grapples for each size
- (3) 1 Control

Basket:

- (1) 2 Grapples
- (2) Mill Control Packers for each size

Mill Control Packer:

- (1) 3 Inner and 3 Outer Seals

Specifications

Maximum Catch Size (Spiral)	6-1/2	6-1/2	6-5/8	6-5/8	6-3/4	7	7-1/4	8	8-3/8	8-1/2	9	
Maximum Catch Size (Basket)	5-7/8	5-3/4	6	5-7/8	6-1/8	6-3/8	6-5/8	7-1/4	7-3/4	7-3/4	8-1/4	
Overshot O.D.	7-5/8	8-1/8	7-3/4	8-1/4	8-1/8	8-1/8	8-3/8	9-5/8	9-1/2	10-1/8	10-5/8	
Standard Box Connection	Per Customer Order											
Type	SH	FS	SH	FS	SH	SH	SH	FS	SH	FS	FS	
Complete Assembly	Part No.	9860	C-5342	4785	C-3032	C-5222	9217	C-5354	264	4834	8960	C-5321
(Dressed with Spiral Parts)	Weight	220	274	235	280	243	251	260	337	314	358	401

Replacement Parts

Top Sub	Part No.	9861	A-5343	9133	A-3033	A-5223	9218	A-5355	265	9063	8961	A-5322
	Weight	87	115	100	120	102	107	114	158	153	165	178
Bowl	Part No.	9862	B-3711	9134	B-3034	B-5224	9219	B-5356	266	9062	8962	B-5323
	Weight	64	—	67	78	69	69	71	84	77	87	97
Packer	Part No.	9865	2372	9136	A-1814	B-5225	9224	B-5357	235	9055	8956	B-5324
	Weight	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8	1-1/4	1-1/4	1-1/2	1-1/2	1-5/8	2
Packer Seat Ring	Part No.	9866	A-2373	9135	A-1815	A-5226	9225	A-5358	241	9056	8953	A-5325
	Weight	3/8	3/8	1/2	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4
Spiral Grapple	Part No.	9863	B-2374	9137	N-84	B-5227	9222	B-5359	238	9057	8957	B-5326
	Weight	5-1/2	5-3/4	5-1/2	6	5-3/4	5-3/4	6	7-3/8	6-1/2	9	10
Spiral Grapple Control	Part No.	9864	B-2375	9138	M-89	A-5228	9223	B-5360	239	9058	8958	B-5327
	Weight	3-1/2	3-1/2	3	3	3	3-1/2	3	4	3-1/2	4-3/4	5
Standard Guide	Part No.	9867	A-2376	9139	A-1818	A-5229	9226	A-5361	240	9059	8959	A-5328
	Weight	60	71	60	72	62	62	64	81	70	90	108

Basket Parts

Basket Grapple	Part No.	9863	B-2374	9137	N-84	B-5227	9222	B-5359	238	9057	8957	B-5326
	Weight	25	28-3/4	26	30	28-3/4	28	30	37-1/8	34	45	50
Basket Grapple Control	Part No.	9864	B-2375	9138	M-89	A-5228	9223	B-5360	239	9058	8958	B-5327
	Weight	9-1/2	10-1/2	8-1/2	9	9	10	9	12	11	13-1/4	15
Mill Control Packer	Part No.	9865-R	L-6635-R	9136-R	A-1814-R	B-5225-R	L-9224-R	B-5357-R	235-R	9055-R	8956-R	B-5324-R
	Weight	11	14	11-1/2	12	12	13-1/2	12	16	15	19	20

How to Order

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RECOMMENDED SPARE PARTS:

Spiral:

- (1) 3 Packers
- (2) 2 Grapples for each size
- (3) 1 Control

Basket:

- (1) 2 Grapples
- (2) Mill Control Packers for each size

Mill Control Packer:

- (1) 3 Inner and 3 Outer Seals

Specifications

Maximum Catch Size (Spiral)	9-5/8	10-1/8	11-1/4	12	14	14-3/4
Maximum Catch Size (Basket)	8-7/8	9-3/8	10-1/2	11-1/4	13-1/4	14
Overshot O.D.	11-1/4	11-3/4	12-3/4	13-3/4	16	16-3/4
Standard Box Connection	Per Customer Order					
Type	FS	FS	—	—	—	—
Complete Assembly Part No.	C-12822	5329	15800	33006	68028	64553
(Dressed with Spiral Parts) Weight	520	642	948	975	—	—

REPLACEMENT PARTS

Top Sub	Part No.	A-12823	5330	15801	33007	68029	64554
	Weight	218	375	500	500	—	—
Bowl	Part No.	B-12824	5331	15802	33008	68030	64555
	Weight	125	115	116	115	—	—
Packer	Part No.	B-12825	5332	15805	33011	68031	64556
	Weight	2-1/4	2-1/2	2-5/8	3	—	—
Packer Seat Ring	Part No.	A-12826	5333	—	—	—	—
	Weight	3/4	3/4	—	—	—	—
Spiral Grapple	Part No.	B-12827	5334	15803	33009	68033	64558
	Weight	12	12	17	16	—	—
Spiral Grapple Control	Part No.	B-12828	5335	15804	33010	68034	64559
	Weight	6	7	11	6	—	25
Standard Guide	Part No.	A-12829	5336	15806	33012	68035	64560
	Weight	130	130	200	110	—	—

Basket Parts

Basket Grapple	Part No.	B-12827	5334	15803	33009	68033	64558
	Weight	60	60	80	50	—	—
Basket Grapple Control	Part No.	B-12828	5335	15804	33010	68034	64559
	Weight	17	21	35	16	—	—
Mill Control Packer	Part No.	B-12825-R	5332-R	15805R	33011	68031R	64556
	Weight	21	28	50	60	—	—

How to Order

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RECOMMENDED SPARE PARTS:

Spiral:

- (1) 3 Packers
- (2) 2 Grapples for each size
- (3) 1 Control

Basket:

- (1) 2 Grapples
- (2) Mill Control Packers for each size

Mill Control Packer:

- (1) 3 Inner and 3 Outer Seals

Bowen Type D Collar Packer Assemblies for Tubing Overshots

Use with Overshot No.	9305	C-4623	C-5080	9270	C-5101
Overshot Maximum Catch	2-3/8	2-1/2	2-1/2	2-7/8	3-1/16
Maximum Size to Pack-off:	1.660	1.990	1.990	2-3/8 OD	2-3/8 OD
Tubing Collar O.D.	EUE	EUE	EUE	UPSET	UPSET
Complete Assembly	Part No.	39380	39382	39383	39384
	Weight	2-5/8	2-7/8	2-7/8	3-3/16

Replacement Parts

Packer Insert	Part No.	9309-D	B-5089-D	B-3395-D	8550-D	B-3594-D
	Weight	2-1/2	2-3/4	2-3/4	3	3-1/4
Spring	Part No.	39412	26154	26154	8539	24044
	Weight	1/8	1/8	1/8	3/16	1/8
O-Ring	Part No.	30-3	30-4	30-4	30-6	30-10
	Weight	1/32	1/32	1/32	1/32	1/32

Bowen Type D Collar Packer Assemblies for Tubing Overshots

Use with Overshot No.	9105	C-4619	9109	C-5151
Overshot Maximum Catch	3-1/8	3-1/2	3-21/32	3-21/32
Maximum Size to Pack-off	2-3/8 OD	2-7/8 OD	2-7/8 OD	2-7/8 OD
Tubing Collar	EUE	NON UPSET	EUE	EUE
Complete Assembly	Part No.	9095	39393	6653
	Weight	4-5/8	5-3/4	4-5/8

Replacement Parts

Packer Insert	Part No.	809-D	L7065-D	6665-D	6665-D
	Weight	4-3/8	5-1/2	4-3/8	4-3/8
Spring	Part No.	808	4183	6654	6654
	Weight	1/4	1/4	1/4	1/4
O-Ring	Part No.	27-35	30-10	30-10	30-10
	Weight	1/32	1/32	1/32	1/32



Type D Collar Packer Assembly

Bowen Type D Collar Packer Assemblies for Tubing Overshots

Use with Overshot No.		5148	C-5129	C-4686	C-5139	C-5154	C-5142	C-5428	C-5425	9515	5896
Overshot Maximum Catch		3-21/32	3-3/4	3-3/4	3-7/8	4	4	4-1/8	4-1/8	4-1/4	4-1/4
Maximum Size to Pack-off		2-7/8 OD	2-7/8 OD	2-7/8 OD	2-7/8 OD	2-7/8 OD	2-7/8 OD	2-7/8 OD	2-7/8 OD	3-1/2 OD	3-1/2 OD
Tubing Collar		EUE	EUE	EUE	EUE	EUE	EUE	EUE	EUE	NON	NON
								UPSET	UPSET		
Complete Assembly	Part No.	39225	39397	39398	39399	39401	39402	39403	39404	9538	5895
	Weight	4-5/8	4-3/4	7-1/4	8-1/8	8-3/8	8-3/8	7-3/8	7-3/8	5-7/8	8-1/2

Replacement Parts

Packer Insert	Part No.	3219-D	5538-D	A-811-D	A-1707-D	B-5157-D	B-1506-D	B-4895-D	1867-D	856-D	189-D
	Weight	4-3/8	4-1/2	7	7-3/4	8	8	7	7	5-1/2	8
Spring	Part No.	6654	6654	6654	914	914	914	914	914	914	6129
	Weight	1/4	1/4	1/4	3/8	3/8	3/8	3/8	3/8	3/8	1/2
O-Ring	Part No.	30-10	30-10	30-10	30-14	30-14	30-14	30-14	30-14	30-14	30-16
	Weight	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32

Bowen Type D Collar Packer Assemblies for Tubing Overshots

Use with Overshot No.		5162	8975	C-5165	C-4814	5737	5698	C-5168	C-4829	C-7096	C-7093	4825
Overshot Maximum Catch		4-1/4	4-1/2	4-1/2	4-1/2	4-5/8	4-5/8	4-3/4	4-3/4	4-7/8	4-7/8	5
Maximum Size to Pack-off		3-1/2 OD	3-1/2 OD	3-1/2 OD	3-1/2 OD	3-1/2 OD	3-1/2 OD	4 OD	4 OD	4 OD	4 OD	4 OD
Tubing Collar		NON	EUE	EUE	EUE	EUE	EUE	NON	NON	NON	NON	EUE
		UPSET						UPSET	UPSET	UPSET	UPSET	
Complete Assembly	Part No.	35696	6104	B-13548	39405	39406	18661	39407	39408	39409	39410	39226
	Weight	8-3/8	7-1/2	9	8	8	9	8-1/2	8-1/2	5-1/2	12-1/2	10-1/2

Replacement Parts

Packer Insert	Part No.	4672-D	6114-D	A-2487-D	B-2199-1-D	195-D	1140-D	B-2199-D	B-2362-D	B-6387-D	B-2455-D	4505-D
	Weight	8	7	8-1/2	7-1/2	7-1/2	8-1/2	8	8	10	12	10
Spring	Part No.	914	6129	6129	6129	6129	18662	6129	6129	39236	39236	39236
	Weight	3/8	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
O-RING	Part No.	30-14	30-15	30-15	30-15	30-15	30-15	30-15	30-15	30-19	30-19	30-19
	Weight	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32

How to Order

Specify:

- (1) Name and number of assembly or part
- (2) Size and complete description of tubing collar
- (3) Any desired spares, by name and part number

RECOMMENDED SPARE PART:
(1) 3 "O" Rings

Miscellaneous O-Ring Seals are normally furnished in sealed plastic bags of 10, 25, or 100 pieces each to prevent deterioration. Other quantities will be furnished in unsealed packages. Packing Sets, however, will always be furnished in sealed plastic bags.

Overshot Guides and Wallhook Guides

If the hole size is so much greater than the fish size that it is possible for the Overshot to pass alongside the fish, an Oversize Guide or a Wallhook Guide must be installed to insure alignment of the fish with the Overshot.

Oversize Guides

For Overshot Guides with Outside Diameter			Wallhook Guides					
Over	To	Weight (Lbs.)	Length of Guide		30"	36"	42"	48"
—	4-1/2	—	Over 5" to 5-1/2" O.D.	Wt. Lbs.	81	94	110	—
4-1/2	5	23	Over 5-1/2" to 6" O.D.	Wt. Lbs.	87	102	117	—
5	5-1/2	27	Over 6" to 6-1/2" O.D.	Wt. Lbs.	93	110	126	—
5-1/2	6	30	Over 6-1/2" to 7" O.D.	Wt. Lbs.	100	117	134	—
6	6-1/2	34	Over 7" to 7-1/2" O.D.	Wt. Lbs.	108	126	144	—
6-1/2	7	49	Over 7-1/2" to 8" O.D.	Wt. Lbs.	115	135	155	—
7	7-1/2	65	Over 8" to 8-1/2" O.D.	Wt. Lbs.	123	145	166	188
7-1/2	8	75	Over 8-1/2" to 9" O.D.	Wt. Lbs.	132	155	177	198
8	8-1/2	85	Over 9" to 9-1/2" O.D.	Wt. Lbs.	—	—	191	213
8-1/2	9	87	Over 9-1/2" to 10" O.D.	Wt. Lbs.	—	—	204	228
9	9-1/2	90	Over 10" to 10-1/2" O.D.	Wt. Lbs.	—	—	244	273
9-1/2	10	110	Over 10-1/2" to 11" O.D.	Wt. Lbs.	—	—	285	318
10	10-1/2	131	Over 11" to 11-1/2" O.D.	Wt. Lbs.	—	—	299	333
10-1/2	11	137	Over 11-1/2" to 12" O.D.	Wt. Lbs.	—	—	312	348
11	11-1/2	143	Over 12" to 12-1/2" O.D.	Wt. Lbs.	—	—	327	366
11-1/2	12	159	Over 12-1/2" to 13" O.D.	Wt. Lbs.	—	—	343	383
12	12-1/2	175	Over 13" to 13-1/2" O.D.	Wt. Lbs.	—	—	360	402
12-1/2	13	183	Over 13-1/2" to 14" O.D.	Wt. Lbs.	—	—	377	421
13	13-1/2	190	Over 14" to 14-1/2" O.D.	Wt. Lbs.	—	—	391	436
13-1/2	14	197	Over 14-1/2" to 15" O.D.	Wt. Lbs.	—	—	404	451
14	14-1/2	205	Over 15" to 15-1/2" O.D.	Wt. Lbs.	—	—	419	467
14-1/2	15	223	Over 15-1/2" to 16" O.D.	Wt. Lbs.	—	—	433	483
15	15-1/2	242	Over 16" to 16-1/2" O.D.	Wt. Lbs.	—	—	448	500
15-1/2	16	250	Over 16-1/2" to 17" O.D.	Wt. Lbs.	—	—	462	516
16	16-1/2	257	Over 17" to 17-1/2" O.D.	Wt. Lbs.	—	—	479	535
16-1/2	17	267	Over 17-1/2" to 18" O.D.	Wt. Lbs.	—	—	496	554
17	17-1/2	278						
17-1/2	18	300						
18	18-1/2	321						
18-1/2	19	327						
19	19-1/2	334						
19-1/2	20	344						
20	20-1/2	353						
20-1/2	21	362						



Oversize Guide

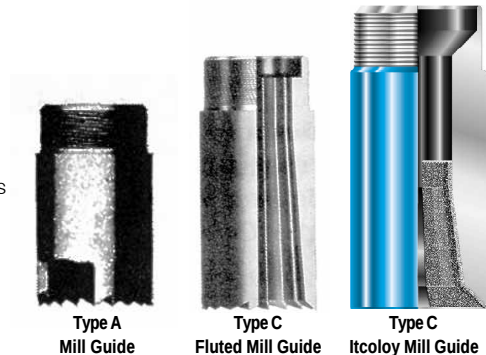


Wallhook Guide

Bowen Overshot Accessories

Milling Guides, Type A and Type C (Fluted and Itcoloy)

In cases where the top of the fish is a badly burred tool joint or drill pipe, a **Type A Milling Guide** should be installed on the Overshot to trim the burr of the fish so that it can enter the Overshot. **Type C Milling Guides** perform the same service on undersize tool joints; they are also used when the top of the fish is an unusually jagged section of pipe. Type C Guides are available as carbonized, fluted guides or Itcoloy Guides.



Type A Mill Guides

Machine Cut and Carburized Teeth to Mill Burrs Off Tool Joints and Drill Collars

Length of Guide	12								16							
Guide Not Over	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10	10-1/2	11
Weight (lbs)	20	27	34	37	38	45	52	57	62	69	75	78	80	88	97	105

Type C Mill Guides

Pipe, Upset Section, or Tool Joint the Overshot Catches

Overshot O.D. Not Over	4-1/4	5-1/2	6	7	7-1/2	8	8-1/2	9	9-1/2	9-3/4
Mill Guide Est. Weight	22	26	36	40	44	52	54	60	65	78

High Pressure Pack-off Assemblies

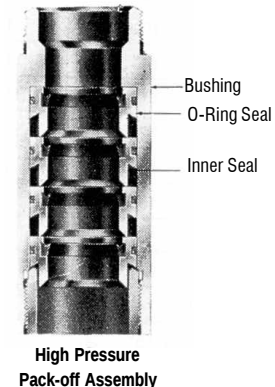
The **High Pressure Pack-off Assembly** is a special assembly for use in areas of extreme pressure. It consists of a Bushing and four packing elements. It is normally installed between the Bowl and the Guide of the Overshot.

High Pressure Pack-off Assemblies for Series 150 Overshots

Use with Overshot No.		9105	9109	5896	8975	6655	8741
Overshot Catch Size		3-1/8	3-21/32	4-1/4	4-3/4	5-1/4	6-1/4
Overshot O.D.		4-1/8	4-11/16	5-9/16	5-3/4	6-3/8	7-5/8
Complete Assembly	Part No.	10255	10260	10357	10265	13595	21091
	Weight	34	41	66	65	92	121

Replacement Parts

Bushings	Part No.	10256	10261	10358	10266	13596	21092
	Weight	18	21	34	33	52	69
Packer (Includes O-Ring) (4 Req'd.)	Part No.	809-HP	6665-HP	169-HP	6114-HP	4505-HP	1642-HP
	Weight	4	5	8	8	10	13
O-Ring Seal (4 Req'd., 1 per Packer)	Part No.	30-14	30-18	30-27	30-27	30-32	30-38
	Weight	1/100	1/100	1/100	1/100	1/50	1/50



* This assembly is installed between Top Sub and Bowl. All others are installed between Bowl and Guide.

How to Order

Specify:

- (1) Name and number of overshot
- (2) Size of fish to be caught

RECOMMENDED SPARE PARTS:

- (1) 2 Sets of Packers (4 per Set)
- (2) 8 O-Rings

Miscellaneous O-Ring Seals are normally furnished in sealed plastic bags of 10, 25, or 100 pieces each to prevent deterioration. Other quantities will be furnished in unsealed packages. Packing Sets, however, will always be furnished in sealed plastic bags.

Type R Replaceable Inner Seals for Control Packers

Listed in Order of Fish Size:

Fish Size		1-7/8	2	2-1/8	2-1/4	2-3/8	2-1/2	2-5/8	2-3/4	2-7/8	3
Inner Seal	Part No.	A-10803	A-10804	A-10805	A-10806	A-10807	A-10808	A-10809	A-108010	A-108011	A-108012
	Weight	1/50	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/24
Fish Size		3-1/8	3-1/4	3-3/8	3-1/2	3-5/8	3-3/4	3-7/8	4	4-1/8	4-1/4
Inner Seal	Part No.	A-10813	A-10814	A-10815	A-10816	A-10817	A-10819	A-10820	A-10821	A-10822	A-10823
	Weight	1/24	1/24	1/24	1/24	1/24	1/16	1/16	1/16	1/16	1/16
Fish Size		4-3/8	4-1/2	4-5/8	4-3/4	4-7/8	5	5-1/8	5-1/4	5-3/8	5-1/2
Inner Seal	Part No.	A-10824	A-10825	A-10826	A-10827	A-10828	A-10829	A-10830	A-10831	A-10832	A-10833
	Weight	1/16	1/16	1/16	1/16	1/12	1/12	1/12	1/12	1/12	1/12
Fish Size		5-5/8	5-3/4	5-7/8	6	6-1/8	6-1/4	6-3/8	6-1/2	6-5/8	6-3/4
Inner Seal	Part No.	A-10834	A-10835	A-10836	A-10837	A-10838	A-10839	A-10840	A-10841	A-10842	A-10843
	Weight	1/12	1/12	1/12	1/12	1/8	1/8	1/8	1/8	1/8	1/8
Fish Size		6-7/8	7	7-1/8	7-1/4	7-3/8	7-1/2	7-5/8	7-3/4	7-7/8	8
Inner Seal	Part No.	A-10844	A-10845	A-10846	A-10847	A-10848	A-10849	A-10850	A-10851	A-10852	A-10853
	Weight	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/4	1/4
Fish Size		8-1/8	8-1/4	8-3/8	8-1/2	8-5/8	8-3/4	8-7/8	9	9-1/8	9-1/4
Inner Seal	Part No.	A-10854	A-10855	A-10856	A-10857	A-10858	A-10859	A-10860	A-10861	A-10862	A-10863
	Weight	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4

Inner Seals to Pass Upset and Pack-off Pipe

		Inner Seals to Pass Upset and Pack-off Pipe											
Pack-off Pipe Size		1-1/4	1-1/2	2-1/16	2-3/8	2-3/8	2-7/8	2-7/8	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2
Pass Upset Size		1-13/16	1.900	2.330	2-19/32	2-21/32	3-3/32	3-7/32	3-3/4	3-13/16	3-15/16	5	5-1/8
Inner Seal	Part No.	A-13366	A-13317	A-13285	A-11690	A-11690	A-11691	A-11692	A-11693	A-11693	A-11694	A-11695	A-11696

How to Order

Specify

- (1) Fish size
- (2) Inner seal part number

RECOMMENDED SPARE PARTS:

- (1) 3 Inner Seals
- (2) Bowen Adhesive



Inner Seal

Type R Replaceable Outer Seals for Mill Control Packers

Listed in Numerical Order of Mill Control Packer Part Numbers:

Notes: In Numerical Order of Manufacturer's Part Number														
Packer No.		169R	235R	809R	1140R	1642R	B2199R	B3395R	B3594R	4505R	B5089R	B5157R	B2225R	B5324R
Outer Seal	Part No.	30-22	27-72	30-11	30-25	30-37	30-26	30-8	30-12	30-30	30-7	30-20	30-39	30-47
Packer No.		5332R	B5357R	B5538R	5950R	L5950R	6114R	6665R	L6665R	L7065R	8550R	8956R	9055R	9122R
Outer Seal	Part No.	30-52	30-41	30-18	30-28	30-28	30-25	30-17	30-17	30-16	30-11	30-46	30-45	30-17
Packer No.		9136R	9209R	L9224R	9309R	9407	9689R	9865R	B10202R	B12825R	15805R			
Outer Seal	Part No.	30-38	30-30	30-39	30-6	MS9021-32	30-36	30-37	30-5	30-49	27-78			

ADHESIVE: Bowen has developed an adhesive which is particularly suited to bonding Type R Inner Seals to Mill Control Packers. It is composed of two compounds, an epoxy resin with strengthening material and a catalyst, which are mixed prior to using. Bowen Adhesive Compound No. 1 (Resin) Part No. 41241-1 and Bowen Adhesive Compound No. 2 (Catalyst) Part No. 41241-2. One-pint cans.

NOTE: Use the Same Outer Seal for Type R and Type E Mill Control Packer

How to Order

Specify

- (1) Mill control packer number
- (2) Fish size
- (3) Outer seal number

RECOMMENDED SPARE PARTS:

- (1) 3 Outer Seals
- (2) Bowen Adhesive



Outer Seal

Extension Subs

If a twist-off has left a fish whose upper end is unengageable, an Extension Sub is installed between Top Sub and the Bowl of the Overshot. This will permit lowering of the Overshot over the fish far enough to insure a secure engagement and a perfect packoff.

Extension Sub Specifications

Sizes		Lengths						
O.D. of Extension Sub		24"	30"	36"	42"	48"	54"	60"
4" to 4-1/2"	Weight	53	64	75	86	97	108	119
Over 4-1/2" to 5"	Weight	59	72	84	97	109	122	135
Over 5" to 5-1/2"	Weight	66	80	94	108	122	136	150
Over 5-1/2" to 6"	Weight	73	88	103	119	134	150	166
Over 6" to 6-1/2"	Weight	90	109	128	147	166	185	204
Over 6-1/2" to 7"	Weight	102	124	146	168	190	212	234
Over 7" to 7-1/2"	Weight	122	148	174	200	226	252	278
Over 7-1/2" to 8"	Weight	127	154	181	209	236	263	290
Over 8" to 8-1/2"	Weight	140	170	200	230	260	290	320
Over 8-1/2" to 9"	Weight	150	182	214	246	278	310	342
Over 9" to 9-1/2"	Weight	178	212	246	280	314	348	382
Over 9-1/2" to 10"	Weight	166	202	238	274	310	346	382
Over 10" to 10-1/2"	Weight	176	214	252	290	328	366	404
Over 10-1/2" to 11"	Weight	184	224	264	304	344	384	424
Over 11" to 11-1/2"	Weight	207	253	298	343	388	433	478
Over 11-1/2" to 12"	Weight	218	266	314	362	410	458	516
Over 12" to 12-1/2"	Weight	230	280	330	380	430	480	530
Over 12-1/2" to 13"	Weight	245	300	355	410	465	520	575

How to Order

Specify:

- (1) O.D. and length of sub
- (2) Overshot O.D. and assembly number

Lock Rings

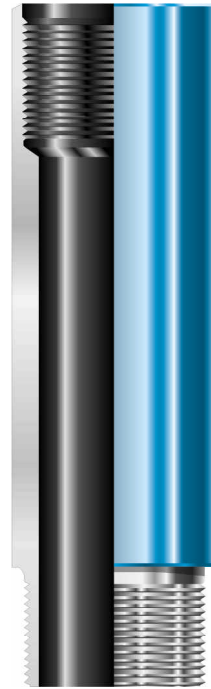
Lock Rings prevent the Top Sub and Bowl of a Bowen Overshot from unthreading when reverse rotation, such as backing-off, occurs. They provide a positive means of locking straight-threaded, shouldered joints without excessive torque or pins. Knurled surfaces on the rings dig into the shoulder when the joint is made-up. Cam teeth between the rings have pitches greater than the thread pitch and these cams produce the locking action.

Lock Ring Specifications

Bowl No.	Size	Lock Ring No.	Spacer No.*
8977	4-3/4" x 5-3/4" O.D.	65280	65373
B-2109	6-1/4" x 7-7/8" O.D.	65296	65376
B-5224	6-3/4" x 7-7/8" O.D.	65302	65377
266	8" x 9-5/8" O.D.	65179	65370
B-5323	9" x 10-5/8" O.D.	65325	67744
5331	10-1/8" x 11-3/4" O.D.	65331	65381
Breakout Clamp Part No.		65912	

Specifications of Lock Rings for other than the Overshots listed will be furnished upon request.

*Used with Type A Packers only (see page 6).



Extension Sub



Lock Rings

Calculated Strengths for Series 150 Overshots

Bowl No.	Max.Catch Size w/Spiral Grapple	O.D. in Inches	Load Capacity at Yield Point (lbs.)			Bowl No.	Max. Catch Size w/Spiral Grapple	O.D. in Inches	Load Capacity at Yield Point (lbs.)		
			Spiral Grapple	Without Stop	With Stop				Spiral Grapple	Without Stop	With Stop
249	6	7-5/8	670,000	580,000	442,000	B-4831	4-3/4	6-1/16	431,000	381,000	275,500
266	8	9-5/8	602,700	510,750	398,600	B-4846	4-5/8	5-15/16	439,200	395,800	285,500
M-266	8	9-5/8	625,000	537,800	406,600	B4971	4-5/8	5-1/2	297,000	258,000	186,200
277	6-3/4	8-3/8	637,000	542,250	408,250	B-5074	2-3/8	3-1/4	211,500	190,000	119,800
905	4-7/8	6-1/8	405,000	367,000	298,000	B-5082	2-1/2	3-5/8	346,200	307,700	219,800
M-1026-1	7-1/4	8-7/8	586,900	515,600	426,500	B-5088	2-1/2	3-3/8	258,000	213,300	163,500
B-1231	8-3/8	10-1/16	637,500	574,300	462,000	B-5100	3-1/16	4-3/16	291,800	263,000	118,200
1248	3-1/2	4-5/8	241,000	256,000	177,000	B-5103	3-1/16	3-15/16	265,400	219,000	160,100
1283	7-3/4	9-3/8	637,000	542,250	408,250	B-5106	3-1/8	4	262,900	217,000	125,100
1446	2-3/8	4-1/8	455,000	390,000	265,000	B-5114	3-1/4	4-3/8	254,000	234,200	147,500
B-1501	7-3/4	9-3/8	592,000	520,000	340,000	B-5117	3-1/4	4-1/8	225,000	202,000	127,500
1641	6-1/4	7-5/8	502,100	449,900	363,200	B-5125	3-3/8	4-1/2	320,000	280,000	176,000
M-1641	6-1/4	7-5/8	542,468	479,044	364,490	B-5128	3-3/8	4-1/4	262,900	217,000	116,800
1657	6-1/4	7-7/8	627,600	542,400	395,000	B-5131	3-3/4	4-5/8	270,600	218,000	150,900
M-1657	6-1/4	7-7/8	645,300	564,000	482,000	B-5138	3-7/8	5-3/16	391,000	352,500	254,500
B-1828	2-7/8	3-3/4	214,000	192,800	121,400	B-5141	3-7/8	4-3/4	370,000	232,000	160,000
B-1836	3-1/8	3-7/8	155,100	144,200	98,000	B-5144	4	5-5/16	402,000	351,000	273,000
B-1871	8-7/8	11-1/4	1,605,000	1,580,000	1,395,000	B-5150	3-21/32	5	394,000	338,000	210,000
1875	6-1/4	7-5/8	542,468	479,044	364,490	B-5153	3-21/32	4-9/16	276,400	228,100	157,900
B-1881	10-1/8	12-1/2	1,364,000	1,207,000	941,700	5156	4	4-7/8	306,200	222,000	126,000
B-2109	6-1/4	7-7/8	586,800	515,600	413,700	B-5156	4	4-7/8	385,000	241,000	167,000
C-2205	6-1/4	7-7/8	640,000	560,000	468,000	B-5164	4-1/4	5-1/8	356,800	301,000	232,200
2382	6-1/2	8-1/4	760,000	650,000	552,000	B-5167	4-1/2	5-3/8	279,000	258,000	186,200
B-2716	8	9-5/8	578,300	508,100	345,000	B-5170	4-3/4	5-5/8	360,400	308,400	234,500
B-2791	5-1/2	7-1/8	637,500	574,300	462,000	B-5173	5	5-29/32	323,500	283,500	218,500
B-3034	6-5/8	8-1/4	637,500	574,300	462,000	B-5179	5-1/2	6-5/8	399,000	350,500	281,300
3075	4-7/8	6-3/8	558,000	510,000	369,000	B-5187	5-9/16	6-11/16	420,000	369,000	296,000
B-3264	7	8-1/8	439,200	395,800	318,400	B-5195	5-3/4	6-7/8	399,000	350,500	238,000
B-3366	6	7-5/8	637,500	574,300	462,000	B-5198	6	7-1/8	435,000	392,000	298,000
B-3522	5-3/4	7-3/8	637,500	574,300	462,000	B-5208	6-1/8	7-1/4	435,000	392,000	298,000
B-3711	6-1/2	8-1/8	586,500	515,500	413,500	B-5216	6-5/8	7-3/4	350,000	306,000	246,000
A-3795	3-1/2	4-1/2	271,000	226,000	146,500	B-5224	6-3/4	8-1/8	531,900	467,300	375,000
B-3798	4-1/2	5-5/8	268,000	320,000	211,000	B-5232	7-3/8	9	637,000	574,300	462,000
B-3812	5-9/16	7-1/4	675,200	608,400	489,400	B-5235	7-3/8	8-1/2	416,000	365,000	292,000
B-3816	6-3/4	8-3/8	612,199	537,860	365,214	B-5243	7-5/8	9-1/4	657,000	578,000	465,000
B-3819	7	8-5/8	637,000	574,300	462,000	B-5251	7-5/8	8-3/4	430,000	385,000	295,000
B-4218	6-1/8	7-3/4	637,000	574,300	462,000	5259	7-3/4	8-7/8	416,000	345,000	276,000
4392	2-7/8	4-1/8	349,000	264,000	176,000	B-5259	7-3/4	8-7/8	430,000	385,000	295,000
4503	5-1/4	6-3/8	403,000	356,000	256,000	B-5267	8	9-1/8	396,000	347,500	236,000
M-4503	5-1/4	6-3/8	397,400	358,400	278,500	B-5283	8-1/2	10-1/8	637,000	574,300	462,000
B-4516	7-1/2	9-1/8	637,000	574,300	462,000	B-5286	8-1/2	9-5/8	419,500	376,000	341,000
B-4519	5-1/4	6-7/8	637,000	574,300	462,000	B-5294	8-5/8	11	1,308,000	1,240,000	1,130,000
B-4563	3-1/2	5-1/8	625,000	526,000	330,000	B-5299	8-5/8	10-1/4	657,000	578,000	465,000
B-4621	3-1/2	4-3/8	267,400	220,700	144,300	B-5307	8-7/8	10-1/2	586,600	515,400	413,600
B-4688	3-3/4	5-1/8	489,000	447,000	354,000	B-5315	9	11-3/8	1,364,000	1,207,300	942,000
B-4693	6-1/4	7-3/8	414,100	373,100	283,600	5323	9	10-5/8	660,000	556,300	445,000
4717	4-1/4	5-1/4	312,500	264,000	196,000	B-5323	9	10-5/8	586,800	515,600	426,500
B-4734	3-1/2	4-13/16	456,000	396,000	286,000	5331	10-1/8	11-3/4	616,000	528,000	435,000
B-4738	2-7/8	4	304,000	221,500	199,000	B-5331	10-1/8	11-3/4	660,000	580,000	468,000
B-4743	2-3/8	3-1/2	309,000	265,500	167,000	B-5346	6-1/2	7-5/8	430,000	385,000	295,000
B-4816	4-1/2	5-13/16	439,200	396,000	286,000	B-5356	7-1/4	8-3/8	430,000	385,000	295,000
B-4821	4-1/4	5-9/16	439,200	396,000	286,000	B-5427	4-1/8	5-7/16	547,600	435,500	277,100
B-4824	3-1/8	4-1/4	291,800	263,000	118,200	B-5430	4-1/8	5	296,000	258,500	201,000
B-4827	5	6-5/8	637,000	574,300	462,000	5700	4-5/8	5-5/8	420,000	378,500	273,000
						M-5700	4-5/8	5-5/8	349,600	315,000	227,000
						5735	4-5/8	5-15/16	514,100	421,300	297,400

NOTE: All strengths listed are calculated theoretical yield points and are accurate within 20%. It should be noted, however, that all strengths assume a straight, steady pull and full grapple engagement of a round fish. Anything less than **full engagement or straight pulling** will reduce the listed strength substantially. This includes tong marks or other damage to the bowl surface.

Calculated Strengths for Series 150 Overshots (continued)

Bowl No.	Max.Catch Size w/Spiral Grapple	O.D. in Inches	Load Capacity at Yield Point (lbs.)			Bowl No.	Max. Catch Size w/Spiral Grapple	O.D. in Inches	Load Capacity at Yield Point (lbs.)		
			Spiral Grapple	Without Stop	With Stop				Spiral Grapple	Without Stop	With Stop
5735	4-5/8	5-15/16	612,700	509,200	361,300	9517	3-7/8	5-1/4	451,000	389,500	276,500
5898	4-1/4	5-9/16	526,600	494,300	362,500	9571	7-1/8	8-1/4	422,000	400,000	307,300
6152	5-3/4	7-3/8	637,000	542,250	421,750	9637	3-3/8	4-3/8	281,500	249,400	167,900
M-6152	5-3/4	7-3/8	656,800	564,000	372,700	M-9637	3-3/8	4-3/8	248,700	224,000	152,900
B-6232	3-7/8	4-5/8	186,800	166,700	104,200	9694	6-1/4	7-3/8	450,400	427,283	327,900
B-7095	4-7/8	6-3/16	404,500	341,200	282,700	M-9694	6-1/4	7-3/8	467,600	444,000	340,400
B-7098	4-7/8	5-3/4	273,500	230,700	178,000	9727	3-3/4	5	391,000	342,600	244,700
B-7103	7-1/2	8-5/8	436,000	385,000	309,000	9747	6-3/8	7-1/2	479,000	454,000	339,000
B-7499	3-13/16	5-1/8	431,000	381,000	275,000	9748	6-1/2	8-1/8	420,000	400,000	325,000
7574	6	7-5/8	611,300	532,600	404,300	9749	6-1/4	7-7/8	655,000	570,000	428,000
7788	5	6-1/8	468,000	440,000	322,000	B-9775	3-13/16	4-7/16	137,500	118,000	44,800
7797	6-1/2	8-1/4	760,000	650,000	552,000	9817	7	8-1/8	453,000	429,500	329,500
7801	7	8-5/8	637,000	542,400	462,000	9852	7-3/4	8-7/8	458,000	435,000	333,000
7806	7-1/4	8-7/8	637,000	542,250	408,250	9862	6-1/2	7-5/8	418,200	396,700	322,900
7811	7-3/4	9-3/8	540,000	475,000	359,000	9984	6-1/4	7-7/8	655,000	570,000	428,000
7831	7-1/4	8-7/8	637,300	564,000	427,700	9998	6	7-1/2	590,000	512,000	390,000
8223	3-1/8	4-1/8	310,200	255,000	170,000	B-10201	2-1/8	2-5/8	101,600	86,400	61,000
8617	5-1/2	6-5/8	386,000	325,000	232,000	B-11323	6-5/8	7-3/4	345,000	315,000	227,000
B-8921	2	2-5/16	50,400	36,300	28,900	B-11825	5-1/8	5-3/4	135,000	115,000	71,500
For 1-1/2 and smaller			—	23,000	15,500	12277	3-21/32	4-11/16	332,000	279,000	199,500
8942	4-3/4	6	422,000	354,000	253,000	12566	6-1/4	7-3/8	471,000	448,000	283,000
8962	8-1/2	10-1/8	602,700	492,000	391,000	12568	6-1/4	7-3/8	471,000	448,000	283,000
M-8962	8-1/2	10-1/8	624,300	576,700	445,500	12694	7-1/2	8-5/8	458,000	414,400	313,400
8965	8-3/4	10-1/2	296,000	251,000	200,000	B-12824	9-5/8	11-1/4	586,800	515,600	413,700
8971	10	11-7/8	828,000	744,000	558,800	B-13681	2-7/8	3-3/4	214,000	192,800	121,400
8977	4-3/4	5-3/4	432,900	411,600	303,275	B-13722	4-3/4	6-1/16	431,000	381,000	275,500
M-8977	4-3/4	5-3/4	338,000	299,000	232,500	B-14142	6-1/8	7-1/4	435,000	392,000	298,000
8980	5-3/4	6-7/8	367,000	332,000	253,000	14762	6-3/4	7-7/8	425,000	381,000	288,000
8997	6-7/8	8	443,000	410,000	318,000	15252	9-1/2	11-3/4	966,500	852,000	635,000
M-8997	6-7/8	8	436,000	406,900	350,000	15802	11-1/4	12-3/4	605,000	562,250	444,000
9011	6-3/8	7-1/2	479,000	454,000	339,000	16397	2-1/8	2-7/8	193,500	173,200	110,200
M-9011	6-3/8	7-1/2	459,600	435,300	323,700	16502	6-3/4	7-7/8	413,000	362,500	246,000
9028	4-7/8	6	405,000	343,000	284,000	17203	1-21/32	4-17/32	260,400	233,400	170,500
9040	5-5/8	6-3/4	405,000	347,000	289,000	17209	7	8-3/8	587,977	557,764	428,051
9062	8-3/8	9-1/2	447,500	424,500	325,500	17422	3-21/32	4-1/2	320,000	295,000	200,500
9098	8-5/8	9-3/4	458,000	435,000	333,000	18439	5-1/4	6-3/8	403,000	356,000	256,000
9107	3-1/8	4-1/8	310,200	255,000	170,000	19092	6-1/4	7-5/8	542,500	479,000	364,500
M-9107	3-1/8	4-1/8	255,000	210,600	140,000	19477	3-1/16	3-5/8	169,300	178,500	97,600
9111	3-21/32	4-11/16	332,000	279,000	199,500	19841	3-21/32	4-11/16	355,000	300,000	213,000
M-9111	3-21/32	4-11/16	332,000	279,000	199,500	20167	8-1/2	10-1/8	600,000	492,000	391,000
9121	3-3/4	4-11/16	261,300	233,000	138,000	21302	3-3/8	3-7/8	102,500	97,500	66,500
M-9121	3-3/4	4-11/16	261,300	233,000	116,600	21381	4-3/4	5-3/4	449,000	420,000	308,000
9134	6-5/8	7-3/4	422,000	400,000	318,000	22991	4-3/4	5-3/4	428,000	410,000	303,000
M-9134	6-5/8	7-3/4	345,000	315,000	227,000	26352	4-3/4	5-3/4	449,000	420,000	308,000
9164	6-3/8	7-3/4	385,500	325,000	232,000	27901	6	7-5/8	670,000	580,000	442,000
9205	5-3/8	6-1/2	385,500	325,000	232,000	28072	22	24-3/4	1,270,000	1,253,800	1,076,250
9211	5-1/2	6-5/8	444,000	379,000	293,000	28332	2-1/16	2-3/8	68,000	48,900	32,900
9219	7	8-1/8	453,000	429,500	329,500	28500	2	2-5/16	50,000	36,000	28,500
9233	7-3/8	8-1/2	422,000	400,000	309,000	For 1-1/2 and smaller			—	23,000	15,500
9239	7-5/8	8-3/4	458,000	435,000	333,000	30082	3-1/16	4-1/8	347,200	347,200	190,400
A-9239	3	3-5/8	129,184	107,435	55,313	31655	16-3/4	20-1/4	NA	1,479,060	1,344,600
9245	7-7/8	9	422,000	400,000	309,000	31765	4-3/4	5-3/4	432,900	411,600	303,275
9271	2-7/8	3-5/8	193,500	157,400	78,700	32775	2-5/32	3-7/32	185,700	166,100	81,200
M-9271	2-7/8	3-5/8	229,100	195,900	102,500	33008	11-7/8	13-3/4	1,022,314	745,564	—
9291	7-1/2	9-1/8	660,200	547,500	409,000	64555	14-3/4	16-3/4	1,197,674	1,226,777	—
B-9296	3-13/16	4-11/16	265,000	214,000	106,000	36537	9-1/4	11	707,400	644,200	520,000
9306	2-3/8	3-1/8	193,500	173,200	118,000	37587	3-1/16	3-3/4	217,700	221,200	179,700
M-9306	2-3/8	3-1/8	215,526	184,312	122,700	47475	3-7/8	5-1/4	451,000	389,500	276,500
9337	6-5/8	8-1/8	590,000	500,000	403,000	68030	14	16	1,164,000	1,175,000	—
M-9337	6-5/8	8-1/8	587,000	505,500	382,500						

NOTE: All strengths listed are calculated theoretical yield points and are accurate within 20%. It should be noted, however, that all strengths assume a straight, steady pull and full grapple engagement of a round fish. Anything less than **full engagement or straight pulling** will reduce the listed strength substantially. This includes tong marks or other damage to the bowl surface.

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* Denotes Manufacturing and Engineering facilities

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